Programming Atmel's EEPROMs: AT17LV020(A) vs. AT17LV002(A)

FPGA Configuration EEPROM Memory

Application Note

Introduction

This application note provides Atmel's customers with a description of the principal differences in programming the AT17LV020(A) and the AT17LV002(A) EEPROMs. It also provides a brief description of the internal structure of both devices.

An AT17LV002(A) device can be used as a drop-in replacement for the AT17LV020(A). No hardware modifications are required.

Users of Atmel's CPS programming software must use the 2-Mbit (mono-002) device option present in CPS version 7.06 or later to successfully program AT17LV002(A) devices. Atmel's CPS program updates can be found at the Atmel web site (www.atmel.com). Simularly, users of third-party programmers must select the AT17LV002(A) device option.

Designers who have embedded the programming algorithm in their system code will have to modify their code according to the differences mentioned below.

Description

Atmel's 2-Mbit AT17LV020(A) EEPROM is a stacked chip solution using two AT17LV010(A) devices electrically connected in a cascaded configuration. The A2 pin of the first internal 1-Mbit EEPROM is connected to the $\overline{CE}$ (nCS pin for the A part) of the second internal 1-Mbit device. The A2 pin of the second internal 1-Mbit EEPROM is actually the A2 pin of the AT17LV020(A). The internal structure of the device is shown in Figure 1 on page 2 and Figure 2 on page 2 for the "A" version.

Atmel's 2-Mbit AT17LV002(A) EEPROM, is a single-die solution chip. This monolithic chip extends the page size of a 1-Mbit AT17LV010(A) device from 128 bytes to 256 bytes. Also, the reset polarity locations of the AT17LV002(A) device are set from 400,000H to 400,003H, compared to 20,000H to 20,003H for the 1-Mbit device or the AT17LV020(A) device. The manufacturer ID of the AT17LV002(A) is set to 1E78 at address location 100,000H, instead of 1EF7 at address location 40,000H for the AT17LV010(A) device or 1E73 at address location 40,000H for the AT17LV020(A) device. The difference is shown in Figure 3 on page 4.

In the programming mode ($\overline{SER\_EN}$ = Low) of the EEPROM, the A2 bit is the software device address bit. The A2 pin of the device is the hardware device address pin. In order to program the EEPROM, the software address bit setting must be matched with the hardware address pin setting.

Rev. 2317B–CNFG–07/02

Figure 1. Internal Structure of AT17LV020 EEPROM (2-Mbit)

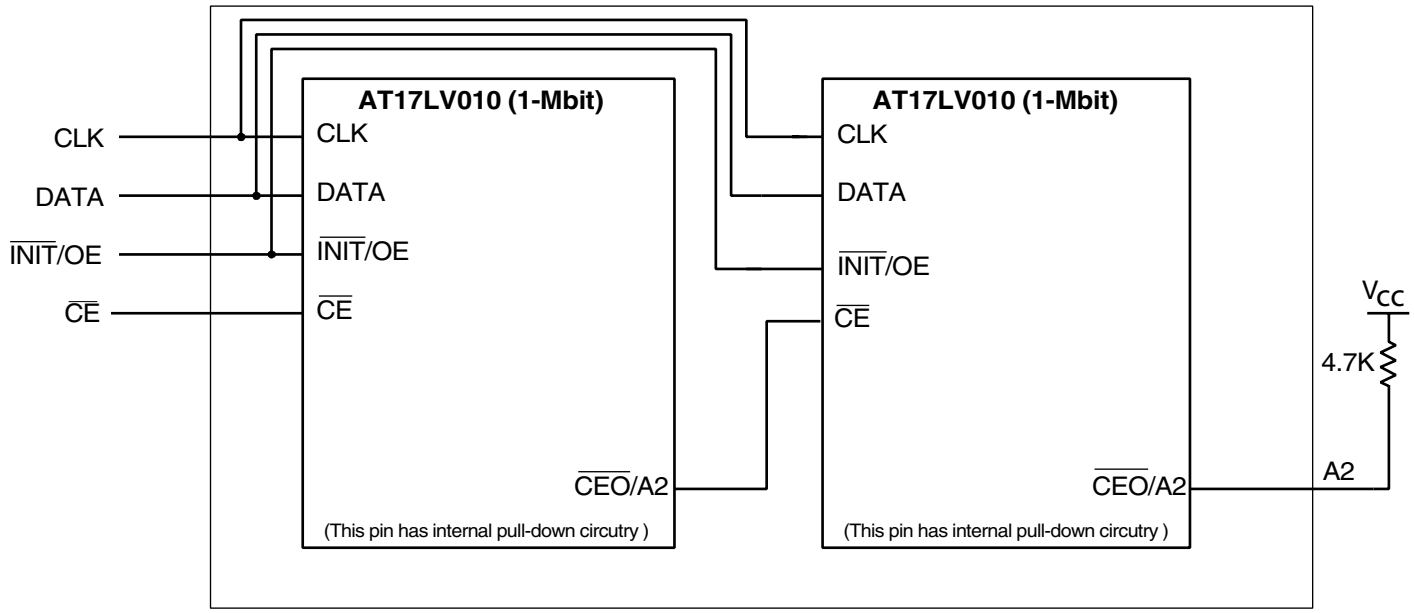
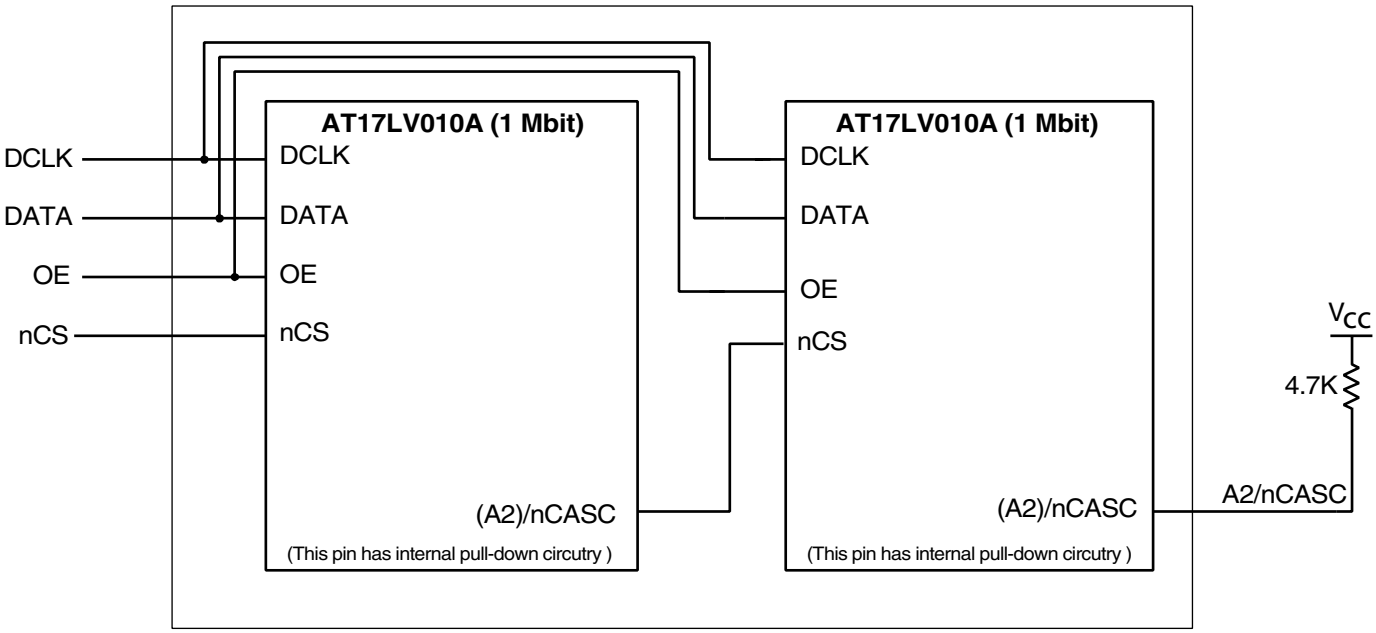


Figure 2. Internal Structure of AT17LV020A EEPROM (2-Mbit)

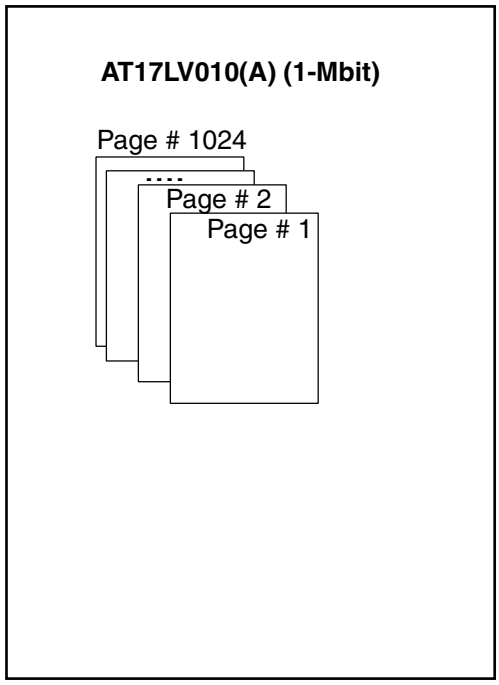


Since the AT17LV020(A) device is implemented using two AT17LV010(A) 1-Mbit EEPROMs, the A2 pin of the first internal 1-Mbit device is automatically set to Low by the internal pull-down circuitry. The A2 bit in the software must be set to Low (“0”) in order to program the data to the first internal 1-Mbit device. Because the A2 pin of the second internal 1-Mbit EEPROM also has a pull-down circuitry, an external 4.7 kΩ pull-up resistor must be connected to the A2 pin of the second internal 1-Mbit EEPROM in order to set the hardware device address to High (“1”). After setting the A2 bit to High (“1”) in the software and connecting an external pull-up resistor to the A2 pin of the device, the data can be programmed to the second internal 1-Mbit device. In fact, to program an AT17LV020(A) EEPROM is just like programming two AT17LV010(A) EEPROMs in cascaded configuration: the programmer must program one internal 1-Mbit device at a time with the proper setting of A2 bits and the A2 pin. The Configurator Programming System (CPS) software supplied by Atmel, automatically sets the A2 pin as described.

Since the AT17LV002(A) EEPROM is a single-die solution chip, an external pull-up or pull-down resistor can be connected to the A2 pin in order to program the data to the device. As long as the software A2 bit setting is matched with the hardware A2 pin setting, the data can be programmed to the device. Since the A2 pin has a weak internal pull-down circuitry, this pin will pull-down to Low if the pull-up or pull-down resistor was not connected to it. For example, if the A2 bit is set to be Low in the software, the A2 pin can either be floating or have a pull-down resistor connected to it. CPS will also support the new device if the counterpart is selected.

The AT17LV020(A) device can be easily replaced with the AT17LV002(A) EEPROM in your circuit. For drop-in programming replace the part in the circuit, as long as the programmer supports the new monolithic AT17LV002(A) device. However, to program the device using your own programming code, the programming algorithm needs to be modified.

Figure 3. Internal Difference between AT17LV010(A) and AT17LV002(A)



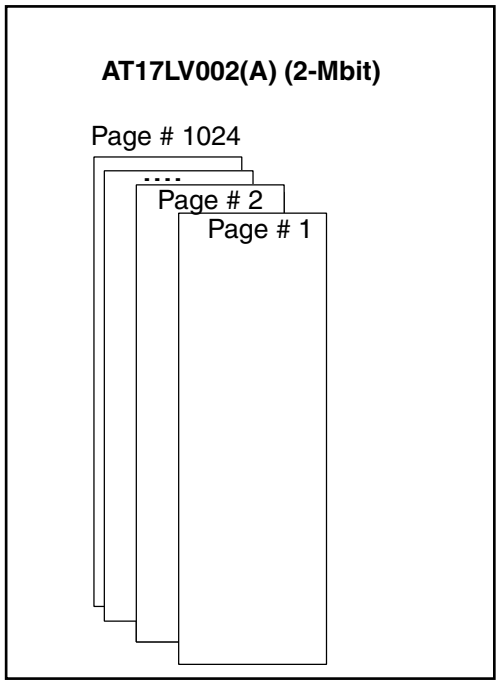
AT17LV010(A) contains 128 bytes per page and 8 bits per location.

The total number of pages is 1024.

Reset polarity locations:
20,000H - 20,003H

Address location for performing Random Read of manufacturer ID:
040,000H

Manufacturer ID: 1EF7



AT17LV002(A) contains 256 bytes per page and 8 bits per location.

The total number of pages is 1024.

Reset polarity locations:
400,000H - 400,003H

Address location for performing Random Read of manufacturer ID:
100,000H

Manufacturer ID: 1E78

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